Claims

1. A method of compensating for the gas flow resistance in a ventilatory apparatus, the method comprising the steps of :

determining the peak exhalation flow rate;

determining the airway resistance;

calculating the effective airway pressure; and

applying a negative airway pressure to an exhalation circuit such that the effective circuit pressure is greater than zero and less than PEEP.

2. A method of claim 1, further comprising adjusting the amount of negative pressure to generate a predetermined effective circuit pressure with a measured value between zero and PEEP.

3. A method of claim 1 further comprising measuring an exhaled tidal volume and adjusting the amount of applied negative airway pressure such that the effective pressure in the exhalation circuit remains constant.

4. A method of claim 3 wherein the steps of measuring the exhaled tidal volume and adjusting the amount of applied negative pressure comprise the steps of :

determining the effective airway pressure and the air flow in the exhalation circuit;

determining instantaneous changes in pressure and flow;

sensing the initiation of an active breathing cycle by comparing said instantaneous changes with predetermined parameters; and

storing these data in a database.

5. A ventilator assist device comprising:

a reservoir for inhaled and exhaled gas in communication with a breathing apparatus adapted for attachment to a patient;

a source of negative pressure in communication with said reservoir;

a data processing unit in electrical communication with said negative pressure source and also in electrical communication with an exhalation flowmeter and a circuit resistance sensor;

said exhalation flowmeter and said circuit resistance sensor in communication with said breathing apparatus;

and a user interface in electrical communication with said negative pressure source allowing direct setting of a value for desired negative airway pressure by a user.

6. The ventilator assist device of claim 5 further comprising:

a flexible canister attached to gas inflow and outflow circuits of a ventilator in pneumatic communication with the exhalation circuit adapted for connection to the patient being ventilated;

an airtight housing surrounding the canister;

a Venturi valve in pneumatic communication with said housing and in pneumatic communication with an external source of pressurized gas;

a controlling processor in electrical communication with the Venturi valve, said controlling processor controlling the flow of said pressurized gas;

a pressure sensor in electrical communication with said controlling processor and in pneumatic communication with said housing;

a control panel in electrical communication with said controlling processor, said control panel allowing direct input of a value for desired negative pressure by the user;

the exhalation flowmeter in electrical communication with said controlling processor, said exhalation flowmeter in pneumatic communication with the airway tubing capable of attachment to a patient and also in electrical communication with the control panel;

the circuit resistance sensor in electrical communication with said controlling processor and said control panel, said circuit resistance sensor in communication with said airway tubing;

wherein said controlling processor adjusts the flow through the Venturi apparatus in response to the flow and resistance determined by said exhalation flowmeter and said circuit resistance sensor to yield a negative pressure around said canister such that a pressure is generated in said airway tubing that is greater than zero and less than PEEP.

7. The controlling processor of claim 6 further comprising:

a first data processor in electrical communication with said exhalation flowmeter and said circuit resistance sensor;

a second data processor in electrical communication with said pressure sensor;

a third data processor that compares input data with predetermined values and calculates the amount of negative pressure to be applied to generate a pressure in said airway tubing greater than zero and less than PEEP;

said third data processor further calculating from the data input from said exhalation flowmeter and said circuit resistance sensor instantaneous values for pressure, flow and resistance in the airway tubing capable of attachment to the patient;

a gas flow controller in electrical communication with said third data processor and in communication with the Venturi valve, said gas flow controller regulating the flow through said Venturi valve in response to data parameters as processed by said third processor;

the database in electrical communication with said first, second and third data processors, wherein said database is adapted for storing data processed by said first, second and third data processors.

8. The user interface of claim 5 further comprising:

a display screen and the control panel, whereby said display screen provides graphic representation of said data parameters contained in the database, and whereby additional values can be entered by the user using said control panel;

said control panel further comprising a plurality of controls;

said plurality of controls in electrical communication with the gas flow controller; and

said user interface in electrical communication with the database, with the third data processor and with the gas flow controller.

9. The controlling processor of claim 6 further comprising:

an alarm system in electrical communication with the third data processor and with the user interface that is triggered by a level of pressure in said airway tubing less than zero or greater than PEEP; and

an override device in electrical communication with said alarm system and with said user interface that discontinues the alarm signal in response to a command input by the user.

10. The controlling processor of claim 7 wherein said first, second and third data processors are independent.

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